

MODIS SCIENCE TEAM MEMBER
Semi- Annual Report (January - June1995)

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a) Task Objectives

The objectives of this phase of the project were: to continue the research program developing the 'at-launch' algorithms for MODIS atmospheric correction, vegetation indices, fire detection and land cover and to build the infrastructure and collaboration to permit the research to be undertaken. The completion of the ATBD revisions and the development of the beta code were given a high priority. The project has developed a number of collaborative projects which are intended to expand the scope of the team members activities and involve a larger community in the MODIS research. Due to the small number of researchers addressing the issues necessary for the methodological advances needed for MODIS, emphasis has been given to developing collaborative research and MODIS outreach through the IGBP Data and Information System Core Project. In addition, the goals of the MODIS project, the status of the instrument and preliminary results of the research were presented at key scientific meetings. The project was also represented at the MODIS Team meeting. Results of the studies undertaken as part of the project are in the process of being written up and submitted for publication.

Ist Quarter: January - March 1995

b) Tasks Accomplished (Data analysis and interpretation)

Specifically the project has addressed the following topics over the last six months:

MODIS Atmospheric Correction:

Modis Beta Delivery: A beta code of MOD09 has been delivered to SDST as well as a test dataset (mas data and synthetic data). SDST started integrating the SDP Toolkit into this code.

6S: A routine to compute the physical properties of a mixture of aerosol types has been introduced into the 6S code. This routine allows the users to consider a mixture of particles originating from different sources (5 max). It also allows the user to directly enter the size distribution derived from combination of satellite and sunphotometer measurements.

Following a meeting held at the Laboratoire d'Optique Atmospherique in Lille in February, a final version of the paper describing 6S has been completed.

MODIS Airborne Simulator:

We started to test the Beta Code on the MAS data from SCAR-A.

Atmospheric Correction Validation:

Sunphotometer Network: A proposal to NASA on LTER Atmospheric Correction has been approved and funded. This will augment the MODIS activities with respect to algorithm validation. TM data is being selected associated with sunphotometer measurements. 5 sites have been selected (Hog Island, HJ Andrews, Bonanza Creeks, NTL and Sevilleta).

A proposal was submitted to the "VEGETATION International Users Committee" and was accepted and travel to meetings was funded. The proposal entitled "VEGETATION Instrument and MODIS: a joint research and development project on terrestrial monitoring" (with E. Vermote as P.I., and J.C. Roger, C.O. Justice and C.J. Tucker as Co.I's.) will provide VEGETATION with methods for calibration and atmospheric correction developed by the investigators. This will enable methods to be explored for the MODIS instrument due for launch 1 year after VEGETATION. The opportunity for the MODIS team to test algorithms on a global data set using the blue channel available on VEGETATION is a unique aspect of this proposal.

MODIS Land Cover:

Justice and Vermote attended the MODLAND working group meeting on BRDF, VI, Atm. Corr and LAnd Cover at Boston University.

The Modis Land Cover Test site initiative is proceeding in the form of the Landsat Pathfinder Global Land Cover Test Site Project. The prototype data set for the HJ Andrews LTER is currently being reviewed by Modland participants.

The IGBP-DIS Land Cover Working Group is attempting to expand the land cover test site initiative with European funding in the context of confidence site validation. These sites will hopefully augment the sites adopted by MODIS for land cover validation.

MODIS Fire Detection:

Luke Flynn completed the first cycle of activity with this project and submitted his final report. (Appendix A).

MODIS Vegetation Index:

The NDVI and MVI were incorporated with the atmospheric correction code in the Beta Code delivery to SDST.

c) Data / Analysis / Interpretation

- Continued analyses of AVHRR, MAS and Landsat TM data were performed as part of the MODLAND prototyping effort.
- The Beta code and associated documentation were delivered to SDST.
- Daily AVHRR 1km data for Brazil for the Pre SCAR-B campaign for a three month period were transmitted over the network from EDC.

d) Meetings Attended

Justice attended the IGBPLand Cover Working Group meeting in Ispra. Justice presented results of the fire detection capability of existing sensors and the improved performance of the MODIS sensor at the AGU Chapman Conference in Williamsburg on Fire In the Environment.

A presentation was made by Vermote at the "MODIS Land Cover, BRDF/Albedo, and surface Reflectance Workshop" held in Boston in January. A report of the correction scheme (modeling and sensitivity studies using simulated data) was shown.

A presentation was made by Vermote during a meeting of co-investigators of remote sensing of aerosols by POLDER in Lille in February. The atmospheric correction scheme proposed for MODIS was presented to the POLDER community.

A presentation on "atmospheric correction in the visible and near infrared for present and future sensors" was made during the "Remote Sensing Science Workshop" at the GSFC.

e) Obstacles

We are still awaiting delivery of calibrated SCAR C data from Sept. 1994.

f) New Papers

Vermote, E. F., Tanr_, D., Deuz_, J.L., Herman, M., and Morcrette, J.J., 1995, Second Simulation of the Satellite Signal in the Solar Spectrum: An overview, submitted to I.E.E.E.

2nd Quarter (April - June 1995)

b) Tasks Accomplished (Data analysis and interpretation)

Specifically the project has addressed the following topics over the last three months:

MODIS Atmospheric Correction:

Modis Beta Delivery: A beta 2 code of MOD09 was delivered to SDST as well as test dataset (MAS data and synthetic data). SDST integrated the SDP Toolkit successfully into this code. Work on integration of the MODLAND thread with SDST continues. The concept was developed with other team members for an integrated approach for atmospherically corrected surface reflectance (MOD09_R), VI's (MOD13) and BRDF/albedo (MOD09_B). Several documents have been prepared to support the development of (MOD09_R, MOD13) (Interface Control Document, HDF data structure, Data Product Reference Guide). Collaboration was undertaken for the development of tools for MODIS processing with SDST (R. Wolfe).

6S: A routine to compute the physical properties of a mixture of aerosol types has been introduced into the 6S code. This routine allows the users to consider a mixture of particles originating from different sources (4 max). It also allows the users to directly enter the size distributions derived from combination of satellite and sunphotometer measurements.

The 6S code has been presented at the "Transmission Conference" in Boston in June. The version 3.2 of the code and a new version of the manual (220 pages) will be available both in postscript and in MS-WORD version on two anonymous ftp sites in August (on "kratmos" at GSFC and on "loasil" at Lille in France).

Following a meeting held at the Laboratoire d'Optique Atmospherique at Lille in February, a final version of the paper describing 6S has been completed and submitted for publication (June).

Works on an improved method to detect DDV in the middle infra-red and then to perform atmospheric correction has been made. A paper is in an internal review process and will be submitted next month.

MODIS Airborne Simulator.

We started to test the Beta 2 Code on the MAS data from SCAR-A. The first comparisons with ECMWF and/or DAO and sunphotometer data have shown promising results.

Atmospheric Correction Validation.

A proposal to NASA on LTER Atmospheric Correction was approved and funded. This will augment the MODIS team activities with respect to atmospheric correction algorithm validation. 5 LTER sites have been selected (Hog Island, HJ Andrews, Bonanza Creeks, NTL and Sevilleta). TM data has been selected associated with sunphotometer measurements and are on order. The Version 0 of processing software for TM atmospheric correction is finished and has been tested with TM data acquired over Hog Island. Vermote organized and ran the LTER/NASA workshop on atmospheric correction (June 25-27) with John VandeCastle (NSF/LTER)

A proposal entitled "VEGETATION Instrument and MODIS: a joint research and development project on terrestrial monitoring" (with E. Vermote as P.I., and J.C. Roger, C.O. Justice and C.J. Tucker as Co.I's.), submitted to the "VEGETATION International Users Committee", was accepted. This proposal will provide collaboration with VEGETATION team members on methods for calibration and atmospheric correction. This will enable methods to be explored for the MODIS instrument launch 1 year before MODIS launch using data from the VEGETATION instrument. The opportunity for the MODIS team to test algorithms on a global data set using the blue channel available on VEGETATION is a unique aspect of this proposal. A presentation of the proposed collaboration was made by Vermote at the VEGETATION program kick off meeting (June 19-21).

Following the acceptance of the proposal "In flight vicarious calibration of the POLDER instrument and quality assessment of POLDER vegetation monitoring capability" (P.I. Eric Vermote), a presentation was made by Vermote during a meeting of co-investigators of remote sensing of aerosol by POLDER in Lille in February. The atmospheric correction scheme proposed for MODIS was presented to the POLDER community.

MODIS Land Cover:

Preparation is being made for the IGBP meeting on Land Cover at Flathead Lake in September, IGBP core projects have been invited..

The MODLAND requirements for test site data are being integrated into the Landsat Pathfinder GLCTS project. Initial evaluation of the H.J. Andrews site has been performed.

MODIS Fire Detection:

Preparation is underway for Beta 3 Code delivery

MODIS Vegetation Index:

Beta 2 code for the VI and MVI was delivered to SDST. Collaboration continues with the University of Arizona on the Beta 3, Level 3 compositing routine.

c) Data / Analysis / Interpretation

- Continued analyses of AVHRR, MAS and Landsat TM data were performed as part of the MODLAND prototyping effort.
- Planning is underway for the MODLAND-SDST meeting in Boston in July.

d) Meetings Attended

- Vermote attended the MCST Level 1b Review.
- A presentation was made by Vermote at the "MODIS Land Cover, BRDF/Albedo, and surface Reflectance Workshop" held in Boston. A report of the correction scheme (Modeling and sensitivity studies using simulated data) was shown (January).
- Vermote made a presentation at the meeting of co-investigators of remote sensing of aerosol by POLDER in Lille (February).
- Vermote attended the "Multisensor Ocean Color Workshop" (February).

- A presentation was made by Vermote and Roger on "atmospheric correction in the visible and near infrared for present and future sensors" was made during the "Remote Sensing Science Workshop" at the GSFC (March).
- Justice and Vermote participated to the MODIS Team meeting (panelists of roundtable on calibration, aerosol, cloud detection, IR, ancillary Data and assimilation , validation) (May)
- Vermote presented the investigations of the VEGETATION proposal at the VEGETATION program kick-off meeting (June).
- Vermote organized and ran with John VandeCastle (LTER) the LTER/NASA workshop on atmospheric correction (June).
- Vermote presented the 6S code at the "Transmission Conference" in Boston (June).

e) Obstacles

We are still awaiting delivery of calibrated SCAR C data from Sept. 1994.

f) New Papers

Vermote, E. F., Tanr_, D., Deuz_, J.L., Herman, M., and Morcrette, J.J., 1995, Second Simulation of the Satellite Signal in the Solar Spectrum: An overview, submitted to I.E.E.E.

Vermote, E. F., El Saleous, N. Z., Kaufman, Y. J. and Dutton, E., Stratospheric aerosol perturbing effect on the remote sensing of vegetation: Correction method for the composite NDVI after the Pinatubo eruption, submitted in June to RSE.

Roger, J. C. and Vermote, E. F., 1995, Computation and use of the reflectivity at 3.75mm from AVHRR channels, will be submitted in August to RSE.